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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/523,310

01/27/2005

Christopher V. Jahnes

FIS920020067US1

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7590

09/06/2006

INTERNATIONAL BUSINESS MACHINES CORPORATION

DEPT. 18G

BLDG. 300-482

2070 ROUTE 52

HOPEWELL JUNCTION, NY 12533

EXAMINER

ROJAS, BERNARD

ART UNIT

PAPER NUMBER

2832

DATE MAILED: 09/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/523,310	Applicant(s) JAHNES ET AL.	
	Examiner Bernard Rojas	Art Unit 2832	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-20 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-19 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-8,11-13 and 20 is/are rejected.
- 7) ☐ Claim(s) 5,9,10 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 6-8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopcroft [US 6,621,387] in view of Dabbaj [2004/0056742].

Claim 1, Hopcroft discloses a micro-electromechanical system (MEMS) s comprising: a cavity [figure 4]; at least one conductive path [110] integral to a first

surface bordering said cavity; a flexible membrane [106a] parallel to said first surface bordering said cavity, said flexible membrane having a plurality of actuating electrodes [406, 408] attached thereto; and a plunger [410] attached to said flexible membrane in a direction away from said actuating electrodes, said plunger having at least one conductive surface to make electrical contact with said at least one conductive path.

Hopcroft fails to disclose that each of the actuating electrodes is energized by a voltage of opposite polarity of the voltage applied to the adjoining actuating electrodes.

Dabbaj teaches actuating the membrane [figures 1, 2a, 2b] of a micro-electromechanical system (MEMS) [10] by alternating the voltage applied to the adjoining actuating electrodes [1,2].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply to electrostatic actuation system of Dabbaj to the Mems device of Hopcroft in order to provide the membrane with improved flexibility and increased actuation force.

Claim 3, Hopcroft discloses the MEMS switch as recited in claim 1, wherein an electrostatic attraction between said actuating electrodes results in bending curvature of said flexible membrane when said actuating electrodes are energized [as shown by the direction of actuation arrow in figure 4].

Claim 4, Hopcroft discloses the MEMS switch as recited in claim 1, wherein said flexible membrane is made of a dielectric material selected from the group consisting of  $\text{SiO}_2$ ,  $\text{SiN}$ , carbon-containing materials that include polymers and amorphous hydrogenated carbon and mixtures thereof [col. 3 lines 63 to 70].

Claim 6, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the bending curvature of said flexible membrane urges said at least one conductive surface of said plunger against said at least one conductive path integral to said first surface bordering said cavity, closing the MEM switch [col. 8 lines 20-46].

Claim 7, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the removal of said applied voltage returns said flexible membrane to its original shape, pulling away said at least one conductive surface of said plunger from said at least one conductive surface integral to said first surface bordering said gap, opening the MEM switch [col. 8 lines 20-46].

Claim 8, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the bending curvature of said flexible membrane is a concave displacement [col. 8 lines 20-46].

Claim 13, Hopcroft discloses the MEMS switch as recited in claim 1, wherein a gap within said cavity separates said plunger from said at least one conductive path [figure 4].

Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Goldsmith et al. [US 5,619,061].

Claim 20, Goldsmith et al. discloses a single-pole-multiple-throw MEMS comprising a plurality of single-pole-single-throw MEMS switches placed in parallel [figure 5], said plurality of single-pole-single-throw MEMS switches being receptively activated by an independent DC voltage control signal [col. 4 lines 30-60].

***Allowable Subject Matter***

Claims 15-19 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach nor suggest, in the claimed combination, a micro-electromechanical system (MEMS) switch comprising: (a) a substrate comprising a conductive metal inlaid path onto which a cavity is formed; (b) on said cavity, a first release layer followed by a first conductive layer and by a second conductive or dielectric layer, said two conductive layers being patterned into the form of an inverted 'T'; (c) a planarized second release layer followed by a third conductive layer; (d) on top of said third conductive layer, a dielectric layer and patterned vias holes to expose a lower conductor; (e) a conductive surface filling said patterned via holes providing a finite thickness above said filled via holes, said conductive surface patterned into the shape of actuating fingers, said combination of (a) through (e) forming a flexible membrane; and (f) via holes perforating said flexible membrane and simultaneously providing access slots outside of said membrane, wherein air replaces said first and second release layers.

Claims 5, 9, 10 and 14 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M-F 8-4:00), every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Br



ELVIN ENAD  
SUPERVISORY PATENT EXAMINER

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